HIGH SCHOOL AND UNIVERSITY MATRICULATION EXAMINATIONS BOARD.

DEPARTMENTAL EXAMINATIONS, 1933.

CHEMISTRY 1.

Time—Two and one-half hours.

Note.—In problems show solutions in full; calculate results to one decimal place.

Values.

1. A small piece of sodium is dropped into a beaker partially filled with cold, distilled water.

2 (*a*) Describe the behaviour of the sodium while in contact with the water.

2 (*b*) Write the equation for the reaction in (*a*).

3 (*c*) Name *three* important properties possessed by the solution remaining in the beaker after all reaction ceases.

7 **2.** (*a*) Describe, using a diagram, a laboratory method for the preparation and collection of hydrogen. Write the equation for the reaction.

2 (*b*) A burning taper is passed into an inverted jar of hydrogen and slowly withdrawn. State what happens.

4 (*c*) Discuss, stating reasons, the suitability of hydrogen as—

(1) An illuminating gas.

(2) A gas for inflating balloons.

9 **3.** *Either* (*a*) Using the Kinetic Theory of Gases, explain why all gases behave in a similar way under ordinary changes of temperature and pressure.

7 (*b*) What volume of hydrogen measured at 665 mm. pressure and 13°C. are produced when 9 grams of magnesium react with an excess of dilute sulphuric acid?

(Mg = 24, H = 1, S = 32, O = 16)

Values.

9 (a) By definite reference to a simple experiment in each case, illustrate each of the following: catalytic action, oxidation, neutralization.

Or

7 (b) Analysis shows that cuprous oxide consists of 88.83% copper and 11.17% oxygen, while cupric oxide consists of 79.9% copper and 20.1% oxygen. Show how these oxides may be used to illustrate the Law of Multiple Proportions.

5 **4.** (a) Write chemical formulae for the following substances:
Sodium carbonate, calcium nitrite, aluminium sulphate, zinc hydroxide, and potassium bisulphite.

6 (b) Describe, using a diagram, a laboratory method for the preparation of hydrogen chloride.

3 (c) Give *three* important properties of the aqueous solution of hydrogen chloride.

6 **5.** (a) Name *three* allotropic forms of carbon.
Describe the outstanding physical properties of each form.

6 (b) How is water gas produced commercially? Write the equation for the reaction involved.

3 (c) Account for the removal, by boiling, of temporary hardness of water.

6 **6.** (a) Describe a laboratory method for the preparation and collection of sulphur dioxide.

4 (b) Mention *two* physical and *two* chemical properties of sulphur dioxide.

2 (c) Why is sulphur trioxide termed the anhydride of sulphuric acid?

7 **7.** (a) Describe the commercial preparation of nitric acid.

4 (b) Write equations for the reactions in (a).

2 (c) State *two* requirements of an explosive, essential for its effectiveness.

2 **8.** (a) Under what conditions would air contain ozone? State *two* instances.

2 (b) Describe a chemical test for detecting the presence of ozone.

6 (c) Give examples to illustrate the action of hydrogen peroxide—

(1) As an oxidizing agent.
(2) As a reducing agent.

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